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Effectiveness of an Academic and Behavioral Remediation Summer Day Camp
on Increasing the Social Skills of Children with Autism

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Abstract

The current study focused on whether an academic and behavioral remediation summer day camp increased the social skills of children with autism spectrum disorders (ASDs). The camp implemented applied behavior analysis (ABA) to address behavior interfering with developing social skills and to increase appropriate social skills. Currently, few studies document the effectiveness of improving social skills at a summer camp program for children with ASDs. This study utilized a pre-post analysis for all participants to compare changes in social skills, as measured by the Social Responsiveness Scale (SRS) and the Home and Community Social Behavior Scales (HCSBS). The measures were completed by the mothers the week before the camp commenced and again during the last week of camp. Significant positive differences between pre- and post- camp response scores were found among social communication, social competence, and peer relations subscales. A significant negative difference was found on autistic mannerisms, antisocial behavior, and deviant/disruptive behavior subscales. This study suggests that an intensive summer camp program utilizing ABA can improve social skills in children with ASDs.

Social Skills Training in Children with Autism

Autistic Spectrum Disorder (ASD) is characterized by three main features: (1) deficiency in gross social skills, such as obstacles in developing and sustaining social relationships and participating in social interaction, (2) impairment in verbal and nonverbal communication, and (3) exhibition of repetitive behavior (O'Riordan, Plaisted, Driver, & Baron-Cohen, 2001). The most prominent features of the disorder are social deficits (Volkmar, Carter, Grossman, & Klin, 1997), which prevent the individual from communicating efficiently and forming close relationships with others.

Educational programs have been developed to teach children with autism social skills that will allow them to communicate and interact with others more effectively. Kennedy and Shukla (1995) surveyed previous research on the social interaction of individuals with autism and the methods that were being used to improve problem behaviors. They determined that “(a) social interactions can be taught and learned, (b) social interaction in typical settings can be successfully accomplished, and (c) substantial positive outcomes accrue” (p. 21). Organized behavioral interventions are successful for individuals with difficulties in interacting socially.

The current study investigated the progress of social behavior in children with ASDs during an 8-week summer intensive day camp. The camp focused on improving academic, behavior, and social skills of the campers. This study explored whether children with autism spectrum disorders can demonstrate increases in social skills after attending an 8-week summer day camp focused on enhancing their academic, behavior, and social skills.

Social Behavior of Children with Autism

Social cognition is a child's ability to interpret verbal and nonverbal cues, such as social and emotional prompts, the ability to identify social and emotional information, being familiar with various social behaviors and the consequences of those social tasks (e.g., conversing with others), and the ability to understand another person's mental state (Crick & Dodge, 1994).

Children with autism have difficulty functioning normally in the aforementioned areas. Research has shown children with autism struggle with assigning mental states to others (Baron-Cohen, 1989); understanding facial, vocal, and bodily expressions of emotion (Braverman, Fein, Lucci, & Waterhouse, 1989); expressing emotions (Macdonald et al., 1989); and coordinating faces and voices (Hobson, Ouston, & Lee, 1988).

The ability to attribute mental states to others and predict subsequent behavior is known as theory of mind (TOM). TOM among individuals with autism has been found to be inferior compared to the TOM of typically developed individuals (Yirmiya, Erel, Shaked, & Solomonica-Levi, 1998) because of their difficulties in understanding the mental states of others. When children with autism were assessed on false belief tasks, which are tasks that focus on the intentions of others, they performed less well when stories resembled real life situations (Ozonoff & Miller, 1995). After an intervention program was used to target increasing TOM abilities, Ozonoff and Miller (1995) observed that although TOM abilities increased in children with autism, they still could not transfer those learned abilities from a clinical setting to real life situations. Because TOM is a difficult ability to learn and perform, children with autism have deficits in all areas related to TOM, including comprehending social action and reason, other's speech, and goal setting (Happe, 1993). Even though an intervention specifically geared toward TOM does not improve a child's ability to understand the emotions of others, teaching social

skills and appropriate behaviors may improve the aspects of TOM to enable children with autism to communicate relatively efficiently with others.

Another difficulty children with autism encounter is interpreting complex facial expressions. They can accurately identify explicit and implicit simple emotions in different situations (Loveland et al., 1997), but have greater difficulties explaining and interpreting both simple and complex emotions. The underlying concepts of emotions are problematic for these children to understand. Behaviors that relate to cultural/social norms (e.g., guilt), reflections of the self to others (e.g., embarrassment), and being responsible for one's own behavior (e.g., pride) are complex emotions children with autism do not easily identify. When asked to give examples of these emotions, children with autism give more scripted, general examples than nonautistic children, are less likely to acknowledge the reactions of others in their example, and answer in a longer time period with more prompts needed to produce the example (Kasari, Chamberlain, & Bauminger, 2001). Children with autism often display difficulties in fully understanding both simple and complex emotions, which causes communication problems with typically developed individuals. If these children sense these communication problems, they become unresponsive to communication attempts by other people, which often leads to problematic social interactions (Koegel, Koegel, Hurley, & Frea, 1992).

Emotion is a major component of nonlateral communication. Nonlateral communication includes any sort of information that an individual must infer from another person's actions and speech in a social context. Individuals with autism often display difficulties in the area of nonlateral communication (Flavell, 1999). Also, they were more inclined to produce "thinking phrases" (e.g., "I think," "I guess"), which Capps, Yirmiya, and Sigman (1992) linked to cognitive effort, suggesting children with autism had difficulty recounting all types of emotion.

An increase in stimulation (e.g., cognitive effort) decreases the responsivity of children with autism to the stimuli, as seen in Burke and Cerniglia (1990). Children with autism performed significantly better on tasks with a single social cue as compared to tasks with multiple cues. Increasing the ability to process more than one cue will allow children with autism to process more social stimuli in their surroundings during interactions with others, which would improve communication with others.

Research on facial processing has found similar results regarding the amount of cues children with autism can identify. For example, Langdell (1978) found children and adults with autism were better able to identify photographs of peers when either the mouths or eyes were isolated. That is, individuals with autism are better able to encode facial information using a single cue rather than multiple cues. The number of cues an individual can encode affects facial processing because individuals use multiple prompts to process facial expressions. Therefore, because individuals with autism use only a single cue to identify a face, they cannot fully understand the emotions or mental states of others.

Another aspect of facial processing is visual reciprocity in relation to non-verbal joint attention deficits, such as difficulties with eye gaze and interpreting body language. Abnormal eye contact is one criteria of autistic disorder in the *Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition – Text Revision (DSM-IV-TR)*; American Psychiatric Association, 2000). Tiegermn and Primavera (1984) studied gaze behavior and noticed it was highly dependent on the social context, type of interaction, and how well the individual with autism knew the interactant. Thus, the reciprocal quality of eye gaze positively affects the social interaction between an individual with autism and a typical person. Other researchers have suggested eye gaze in individuals with autism is related to overarousal (Richer & Coss, 1976;

Tinbergen & Tinbergen, 1983). The task of attempting to make eye contact causes the individual with autism to overstimulate, which then causes social avoidance behavior, such as gaze aversion.

The major basis of communication and social interaction is the language used to express oneself. Children with autism often have unusual language patterns such as pronoun reversal (Kanner, 1946), difficulty in generalizing the meaning of words to different contexts, echolalic speech, abnormal syntax, and irregular patterns of word formation (Pierce & Bartolucci, 1977). When the children reverse pronouns, they will either use “me” instead of “you,” and vice versa, or use his name instead of “I.” Cunningham (1966) noted that pronoun reversal does not relate to identity confusion but to difficulties in understanding linguistics. These linguistic difficulties are further seen with the child’s difficulties in generalizing words that describe relationships (e.g., pronouns and prepositions) but not objects and events. The difficulty in processing linguistic forms leads children with autism to speak in a stereotypical pattern with the absence of colloquial phrases (Ricks & Wing, 1975). While typically developed children overgeneralize experiences to develop language acquisition (Anglin, 1977), children with autism often lack these skills. Difficulties with cognitive relationships make social interaction problematic for children with autism because individuals must use generalizations to understand social behaviors and speech.

The second most common feature of the autistic language is echolalia (Savage, 1968). Research has demonstrated echolalia is used to express communicative intent (Prizant, 1983). Fay (1967) found children with autism produced a delayed echo to complete a meaningful communicative act, or to convert a grammatical unit within an echolalic utterance to produce a more grammatically appropriate utterance. For example, if a child was asked, “Do you want to

play?”, the child may respond in the following ways: “Do me want to play?”, “Do you want to play, yes please?”, “Me do want to play, yes please.” Even though these are clear deficits in language skills of children with autism, they can be learned through intense interventions geared toward teaching the child correct language skills to communicate with others.

Children with autism have deficits in social behavior, which leads to poor communication with typical peers. Because individuals with autism often display inferior TOM abilities, they often have difficulties expressing emotions, understanding facial expressions, or comprehending the mental states of others. These difficulties in social behavior create grammatical and verbal problems for children with autism. With specialized training, children with autism can acquire the proper social skills to complete simple communication tasks.

Social Skills Training in Children with Autism

Researchers have suggested one of the primary difficulties of children with autism is their social deficits (Fein, Waterhouse, Lucci, & Snyder, 1985). Unfortunately, research highlighting successful social skill programs for these children has not been well documented. The present study’s goal is to demonstrate that attending an 8-week camp can enhance the social skills of children with autism. The camp used applied behavioral analysis (ABA) to modify behaviors that interfered with learning to teach and reinforce appropriate social interactions with peers and adults.

ABA is the treatment choice for interventions with children with autism (Green, 1996). The National Research Council (2001) identified the most effective interventions for individuals with autism occur 25 hours per week, 5 days per week, and 12 months per year. The following have been identified as essential for effective treatment: the use of intensive instruction; one-to-one and small-group instruction; instructional objectives addressing social, communication,

adaptive living, recreation-leisure, cognitive, and academic skills; ongoing monitoring of the effectiveness of interventions; and opportunities for supported interaction with typical peers. A growing amount of research has concluded children with autism who receive early intensive ABA have improved developmental progress and intellectual performance (Lovass, 1987; McEachin, Smith, & Lovass, 1993; Perry, Cohen, & DeCarlo, 1995; Sallows & Graupner, 2005). An important aspect of developing an effective ABA program is the evaluation of children's skill and developmental levels before implementing the program. Treatment is dependent upon the appropriate evaluation of strengths and weaknesses. This ensures children can reach their highest potential and level of independence (Maurice, Green, & Luce, 1996).

Pivotal response training (PRT) and self-management are two research-based instructional strategies that have effectively increased social skills in children with autism. PRT emphasizes responsiveness to multiple cues and improved motivation through the four-step sequence of cue, child response, consequence, and pause (Arick et al., 2005). During PRT, the child chooses the activity or object and the reinforcer is a natural consequence to the behavior being rewarded, which allows the child to stay engaged throughout all activities (Pierce & Schreibman, 1995). When PRT was used to teach appropriate social skills to two adolescents with autism, social behaviors such as verbal perseveration and inappropriate facial expressions improved and generalized to other settings (Koegel & Frea, 1993). As compared to more structured teaching methods, parents also appear happier and more relaxed when using PRT with their children (Schreibman, Kaneko, & Koegel, 1991).

Self-management is a procedure that requires individuals to become responsible for monitoring their own behavior and administering contingent rewards and consequences (Bregman, Zager, & Gerditz, 2005). This procedure has been found to be effective in modifying

the social behaviors and academic skills of children with autism (L. Koegel, Koegel, & Ingham, 1986; Harris, 1986). The benefits of this intervention included increased independence, better generalization to other settings, and greater success in addressing several problem behaviors at once (R. L. Koegel, Frea, & Surrent, 1994; L. K. Koegel, Koegel, & Parks, 1992).

After learning self-management techniques, children were able to monitor their own behavior without a treatment provider present (L. Koegel, Koegel, & Parks, 1992). Koegel et al. (1992) trained children with autism in self-management techniques to increase social responsivity. After the completion of the program, the children's disruptive behavior decreased and was replaced by improved responsivity. By acquiring a specific language skill, the children were able to generalize self-management to other language skills. Self-management allowed children to have more fluid conversations with their typical peers, which further reinforced the newly learned skills. In another study, a combination of social skills training and self-management procedures were used to teach adults with disabilities (including autism) appropriate social behavior at a work site (Agran, Salzberg, & Stowitschek, 1987). The improvements in social skills were maintained at a 3 to 4 month follow-up. Children with autism can learn to understand their behavior and its effect on others, but need training in self-management to respond appropriately and facilitate proper interactions.

Although ABA is an effective intervention for social skills, educational placement is one of the key contributors on how well children will improve when involved in a social skills program. Research has supported inclusion with typically developing peers within the school setting and that children with autism can benefit from interacting with typical peers (Fryxell & Kennedy, 1995; Guralnick, Gottman, & Hammond, 1996). The developmental delay of children with autism also inhibits their ability to model socially appropriate behaviors of typically

developing peers (Guarlick & Weinhouse, 1984). Even though the interaction between typical children and children with developmental delays often is beneficial, children with autism often have difficulty understanding and correctly interpreting the behavior of typical peers. Thus, they need individualized training to learn socially appropriate behavior.

Commercially available programs also have been used to improve social skills among children with developmental delays. One specific program assessed by Guglielmo and Tyron (2001) was *Taking Part, Introducing Social Skills to Children* (Cartledge & Kleefeld, 1991). This program taught essential social skills through examples, question answering, and providing feedback. Results indicated the program increased target behaviors, sharing, and being in a group, when combined with reinforcement. Children with autism perform best in organized, predictable settings with individualized attention (Collaborative Work Group, 1997). When combined with reinforcement, target behaviors can improve through structured learning.

Social stories are another means for children with autism to learn cues and behavioral component skills to accomplish a larger task, such as appropriate social interaction. Social stories combine empirically-based special education instructional tools, such as social modeling (Bandura, 1971), task analysis (Englemann & Carnine, 1982), visual aides (Dettmer, Simpson, Myles, & Ganz, 2000), practice with corrective feedback (Bandura, 1971), and priming (Schreibman, Whalen, & Stahmer, 2000). Typically, verbal and visual cues are used to depict the environment, whereas cues in the environment are used to respond to stimuli and typical behaviors in the setting (Barry & Burlew, 2004). Because of their practicality, social stories have been successful in increasing social and behavioral skills of high-functioning children with autism (Gray, 1994). The success of social stories with children with autism confirms children with autism can effectively learn through modeling. Social stories are not directly being utilized

in the current study, but the information is important to fully understand what tools effectively increase social skills in children with autism.

Social Skills Training at Summer Camps

Research in the area of social skills at summer camps is not well-documented. The goal of many social skills training programs is to improve the functional behavior of children, which includes increasing self-help behaviors, facilitating appropriate language, and decreasing undesirable behavior. In a 3-week summer program, Hung and Thelander (1978) trained children with autism in appropriate functional behaviors. Overall, the program improved the children's social skills for each behavior learned. Even in a short time span, children with autism were able to learn appropriate behavior through guidance and reinforcement.

Brookman et al. (2003) published an article describing the elements of a full-inclusion summer day camp program for children with autism and typically developing peers using ABA strategies. The goal of the program was to assist the children with autism in a summer camp setting and develop social behaviors with their typically developing peers. The interventions used were priming, self-management, and facilitating peer involvement and interaction. A statistical analysis was not completed, but the article concluded that the children with autism were successfully able to participate in the camp activities with help from the aides. Because the camp focused on peer interaction, the successful participation of the children suggested an improvement in social skills.

Children with autism lack an innate ability to develop social skills, so they must be taught basic social skills. Even though their difficulties in social skills result in communication problems, children with autism are able to learn socially acceptable behavior through structured training that is specific to each child. Therefore, after an 8-week attendance at an autism

academic and behavioral remediation summer day camp, it was hypothesized that there would be an increase in the social skills of children with ASDs. With the lack of research in the area of social skill improvement at summer day camps, this study is important to determine whether social skill training can be incorporated into a summer camp setting for children with ASDs. Research in social skill training has focused on school and private settings, but documenting the effectiveness of social skill training in the summer camp setting can broaden the application of the interventions used to develop social behaviors.

Method

Participants

Twenty-two children with an Autism Spectrum Disorder (ASD) participated in this study. The children attended an 8-week academic and behavioral remediation autism summer day camp. The ages of the participants range from 6 to 11 years old, with a mean age of 9 years with a standard deviation of 1.38 months. Five of the participants were female, while 17 were male. Twenty-one children were Caucasian, while one child was classified as “other.” All of the children were previously diagnosed with an Autism Spectrum Disorder by a licensed professional (e.g., licensed psychologist, physician, school psychologist) through meeting criteria from the *DSM-IV-TR* (American Psychiatric Association, 2000), had an Individual Education Plan (IEP), and were receiving special education services during the academic school year. Seventeen children were previously diagnosed with autism (9 children with mild severity and 8 children with moderate severity), one child was previously diagnosed with Aspergers Disorder (mild severity), and five were previously diagnosed with pervasive developmental disorder- not otherwise specified (PDD-NOS; 3 children with mild severity and one child with moderate severity).

Instrumentation

The Social Responsiveness Scale (SRS; Constantino, 2002) and Home and Community Social Behavior Scales (HCSBS; Merrell & Caldarella, 2000) were used to assess the social skills of the participants before and after the camp.

SRS. The SRS is a 65-item rating scale that measures social interaction of children with ASDs in natural settings. The questionnaire covers five subscales: social awareness (8 items), social cognition (12 items), social communication (22 items), social motivation (11 items), and autistic mannerisms (12 items). The social awareness subscale measures the individual's ability to pick up on social cues represented by aspects of reciprocal social behavior. The social cognition subscale measures the individual's ability to interpret social cues. The social communication subscale measures the expression of social behavior through "motoric" aspects of reciprocal social behavior. The social motivation subscale measures the extent to which the respondent is motivated to engage in social-interpersonal behavior, which can include elements of social anxiety, inhibition, and empathic orientation. The autistic mannerisms subscale measures the stereotypical behaviors or highly restricted interests of autism. Each item rates the frequency of the behavior on a scale from zero (not true) to three (almost always true).

Means and standards deviations were calculated using *T*-scores for the SRS subscales. The subscales have a standardized mean of 50 and standard deviation of 10. The descriptive classification of SRS subscales are as follows: 59 and below are considered "normal," 60 to 75 is considered "mild to moderate," and 76 and higher is considered "severe."

The SRS correlates very favorably with the Autism Diagnostic Interview-Revised (ADI-R; $r > 0.64$), which is a popular tool used in diagnosing autism. Test-retest reliability has been very good with correlations between .83 and .88. Inter-rater reliability between parents and

teachers ranged between correlations of .73 and .75. Alpha and internal consistency correlations for each subscale were analyzed to determine how well items fit into their assigned subscale and the correlation of the items with the full subscale, respectively. The findings suggest a high degree of internal consistency, indicated by the following results: social awareness, $\alpha = 0.77$, $r > 0.64$; social cognition, $\alpha = 0.87$, $r > 0.66$; social communication, $\alpha = 0.92$, $r > 0.62$; social motivation, $\alpha = 0.82$, $r > 0.60$; and autistic mannerisms, $\alpha = 0.90$, $r > 0.72$. (Constantino et al., 2004). Overall, the SRS has appropriate levels of validity and reliability.

HCSBS. The HCSBS is a 65-item social behavior rating scale for use by parents and caretakers of children and youth ages 5–18 to assess social competence and antisocial behavior in the home and community settings. It is composed of two scales, the Social Competence scale and the Antisocial Behavior Scale, with two subscales for each component scale. The 32-item Social Competence scale measures adaptive and positive social behavior, and is composed of two subscales, the peer relations subscale (17 items) and the self-management/compliance subscale (15 items). The peer relations subscale reflects behavior characteristics important in making friends and being well liked by other children. The self-management/compliance subscale reflects behaviors and characteristics that are important in responding to social expectations of parents, teachers, and other influential adults in a child's life. The 33-item Antisocial Behavior scale measures socially-related problem behaviors, and is composed of two subscales, the defiant/disruptive behavior subscale (15 items) and the antisocial/aggressive subscale (17 items). The defiant/disruptive subscale reflects oppositional and explosive behaviors. The antisocial/aggressive subscale reflects dishonesty, coercive behavior, lack of empathy, violation of rules, and threatening behavior. All items are rated using a 5-point scale of one (never) to five (frequently).

Means and standards deviations were calculated using *T*-scores for the HCSBS subscales. The subscales have a standardized mean of 50 and standard deviation of 10. The descriptive classification of social competence total score is as follows: 12 to 29 is considered “high risk,” 30 to 41 is considered “at-risk,” 42 to 58 is considered “average,” and 59 to 67 is considered “high functioning.” The descriptive classification of peer relations subscale are as follows: 12 to 30 is considered “high risk,” 31 to 41 is considered “at-risk,” 42 to 58 is considered “average,” and 59 to 65 is considered “high functioning.” The descriptive classification of self-management/compliance subscale are as follows: 16 to 29 is considered “high risk,” 30 to 40 is considered “at-risk,” 41 to 58 is considered “average,” and 59 to 68 is considered “high functioning.” The descriptive classification of antisocial total score is as follows: 37 to 57 is considered “average,” 58 to 71 is considered “at-risk,” and 72 to 89 is considered “high risk.” The descriptive classification of defiant/disruptive subscale is as follows: 36 to 58 is considered “average,” 42 to 68 is considered “at-risk,” and 69 to 85 is considered “high risk.” The descriptive classification antisocial/ aggressive subscale is as follows: 40 to 55 is considered “average,” 56 to 71 is considered “at-risk,” and 72 to 97 is considered “high risk.”

The scale has strong psychometrics, with high high-order factor coefficients ranging from 0.90 to 0.93 for all scales. High test-retest reliability was documented, with coefficients ranging from 0.82 to 0.91 for all scales ($p < 0.001$). Moderate interrater reliability was found, with coefficients ranging from 0.85 to 0.86 for the Social Competence scale scores, and 0.64 to 0.73 for the Antisocial Behavior scale scores.

Procedure

The children attended the Autism Academic and Behavioral Remediation Summer Day Camp for 8 weeks. An application for the camp was distributed to parents through local autism

support group meetings, teachers, psychologist's offices, and by personal requests of parents. In addition, the application form was distributed to Directors of Special Education within the surrounding area. Children participated in the camp daily from 8:30 a.m. to 4:30 p.m. (Monday through Friday). An instructional team of one teacher/counselor, one tutor/counselor, two counselors, and one behavioral clinician worked with seven to nine children who were grouped based upon age and severity of autism. The teacher/counselors were predominately preservice special education and regular education teachers. The four lead teachers for math, science, language arts, and music/health were preservice teachers who had completed student teaching or had graduated and were teaching. The teacher/counselors and tutor/counselors were supervised by a licensed special education teacher, who had taught for over 7 years. All teacher/counselors, tutor/counselors, counselors, behavior clinicians, and administrative staff participated in a weeklong training program prior to the start of camp. A licensed psychologist conducted training on ASDs, while a Board Certified Behavior Analyst (BCBA) conducted training on basic ABA principles. Everyone also received CPR, First Aide, restraint, and crisis training. Role playing activities were conducted throughout the training to reinforce techniques and skills taught using formal lectures. Behavioral clinicians also conducted daily training as needed for the teacher/counselors, tutor/counselors, and counselors during the 8-week camp. The behavioral clinicians meet regularly (2-3 times per week) with the BCBA to discuss and modify behavioral plans as needed.

The four groups of seven to nine children were kept physically separated the majority of the day. Through out the day, the children received points for meeting their behavioral goals for the day. During the morning, each child participated in three hours of academic classes with his/her group in the areas of math, language arts, science, or music/health. At lunch, awards were

given to the camp attendees to target social recognition specific to each child (e.g., Sitting Bull Award for staying on his bucket during science or health class, Hand in the Sky Award for raising her hand and participating, Helping Hand Award for helping a friend in Language Arts class). Following lunch, the groups rotated between group activities focused on enhancing social skills and individual tutoring.

In the afternoon, all children received 30-40 minutes of one-on-one tutoring. One tutor/counselor was assigned to each group. In the morning, tutors would develop individualized tutoring lessons for each child in his/her group. Sensory items, manipulables, lessons materials were put in individual tote bags. In the afternoon, a teacher/counselor, tutor/counselor, or counselor would take the tote bag and tutor the child. Typically, the tutors focused on a child's most difficult academic area (e.g., reading comprehension, math calculation, oral ready). The social skills activity focused on group activities. Local artists, musicians, and counselors/psychologists would come to camp and conduct an activity (e.g., modeling clay, relaxation therapy, playing instruments). The primary goal was to teach the children social skills, increase their social interaction, and increase their participation in group activities. The four groups participated in all activities each day.

During the remainder of the day, the children were able to redeem their earned points (colored wrist bands) for a "payoff." Children would start the day with a colored wristband and would earn marks on their band for meeting his/her specific behavioral objectives. Once a band had a certain number of marks, the child would get another different color wristband. The child would then earn marks until they earned another colored wristband. The colored wristbands corresponded to the color levels for payoff with the highest color always being swimming and playground.

Because the summer camp focused on improving both academic and behavioral skills, the program was set up to facilitate social skill learning throughout the entire day. During classes, the children were rewarded with points for participation, appropriate responses to teachers' questions, interacting appropriately with peers, and participating in group activities. To improve social skills, counselors used prompting of social behaviors and correction to adjust appropriate behavior. The camp focused on greetings, specifying names of people and objects, conversing with others, following instructions, sharing and taking turns, manding for objects and requesting help, and communicating and understanding emotions. The independent variable was the summer camp, while the dependent variable was the improvement in social skills. The improvement in social skills was determined by the child's acquisition and development of the behaviors. The instruments served as a guide for the extent to which they improved in the specified social skill areas.

When enrolling their child into the camp, the mothers were aware of the present study. The mothers signed an informed consent, which stated the procedures and goals of the study. A week before the camp began, the mothers completed the two assessment scales for their child. The inventories were administered to the mothers at an orientation meeting; the majority of the mothers completed the inventories at home and returned them during the first day of camp.

During the first week of camp, one graduate level behavior clinician was assigned to one of the four groups of 7 to 9 children. Under the supervision of a BCBA, the behavior clinicians evaluated the behavioral and social levels of each child. The assessment consisted of observations and a full functional assessment of the child's behavioral capabilities. The behavior clinician created an individualized behavioral plan with specific goals that the child should meet by the end of the camp. Each plan varied in difficulty level, but generally consisted of (a)

increasing appropriate (verbal and nonverbal) interactions between peers; (b) increasing appropriate on-topic responses and questions during social interaction; (c) improving their ability to follow directions; and (d) developing the appropriate expression of emotions. Throughout the course of the camp, the behavioral clinician continually assessed the child's behavior to determine whether the individualized plan was benefiting the child. Alterations were made if the child was not improving or was improving faster than expected.

After the camp ended, the mothers completed the same inventories to determine whether each child's social skills improved. The inventories were distributed to the mothers on the first day of the last week of camp and were returned on the last day of camp.

Results

The range, mean, and standard deviation for the SRS are shown in Table 1. The autistic mannerisms subscale displayed the highest standard deviation among the pre- and post-test scores ($SD = 19.22$; $SD = 16.43$). The social communication subscale had the lowest standard deviation among pre- and post-test scores ($SD = 12.09$; $SD = 13.76$).

Mother's responses were coded using the SRS Scoring Worksheet. A repeated one-way analysis of variance (ANOVA) was used to assess the differences between the pre- and post-camp total t-scores on the SRS. Overall, the results suggest the pre-camp response scores were significantly different than the post-camp response scores, $F_{1,21} = 36.576$, $p < 0.001$, $\alpha = 0.05$, $\eta^2 = 0.63$.

Five subscales were analyzed to determine which social characteristics were responsible for the difference between pre- and post- camp response scores. A significant difference between pre- and post- camp response scores was found in two subscales: social communication, $F_{1,21} = 19.156$, $p < 0.001$, $\alpha = 0.05$, $\eta^2 = 0.477$, and autistic mannerisms, $F_{1,21} = 6.476$, $p = 0.019$, $\alpha =$

0.05, $\eta^2 = 0.245$. The results did not indicate a significant difference between scores on the subscales of social awareness ($F_{1,21} = 2.331$, $p = .142$, $\alpha = 0.05$, $\eta^2 = 0.1$), social cognition ($F_{1,21} = 2.495$, $p = 0.129$, $\alpha = 0.05$, $\eta^2 = 0.106$), and social motivation ($F_{1,21} = 2.495$, $p = 0.129$, $\alpha = 0.05$, $\eta^2 = 0.106$).

Each subscale was composed of specific items to determine the level of social functioning. The average difference between the pre- and post- camp response scores was calculated to determine which items had the greatest impact on the overall subscale results. For social communication, the following items had the greatest mean differences between pre- and post- camp response scores: Item 12, “Is able to communicate his or her feelings to others” (increase; $\mu = 0.59$, $SD = 0.85$), Item 13, “Is awkward in turn-taking interactions with peers” (decrease; $\mu = 0.41$, $SD = 1.05$); Item 19, “Gets frustrated trying to get ideas across in conversations (decrease; $\mu = 0.36$, $SD = 0.58$), and Item 55, “Knows when he or she is too close to someone or is invading someone’s space” (increase; $\mu = 0.48$, $SD = 0.98$). This suggests these items had the most impact on the subscale social communication. For autistic mannerisms, the following had the greatest mean differences between pre- and post- camp response scores: item Item 14, “Is not well coordinated” (decrease; $\mu = 0.41$, $SD = 1.05$), Item 20, “Shows unusual sensory interests” (decrease; $\mu = 0.45$, $SD = 0.67$); Item 28, “Thinks or talks about the same thing over and over” (decrease; $\mu = 0.41$, $SD = 0.80$); Item 29, “Is regarded by other children as weird or odd” (decrease; $\mu = 0.32$, $SD = 0.57$); and Item 31, “Can’t get his or her mind off something once he or she starts thinking about it” (decrease; $\mu = 0.27$, $SD = 0.98$). These mean differences suggest these items had the greatest impact on the overall difference between response scores. Also, based on the greatest mean difference, the social behaviors that these items measured could be the most changed social behaviors from pre- to post-camp.

The range, mean, and standard deviation for the HCSBS are shown in Table 2. The self-management/compliance subscale displayed the highest standard deviation ($SD= 12.24$) among the pre-test scores. Among the post-test scores, the antisocial/aggressive subscale had the lowest standard deviation ($SD= 12.73$). The lowest standard deviation for pre-test scores was the peer relations subscale ($SD= 7.35$), while the lowest standard deviation for post-test scores was the antisocial behavior total scores ($SD= 9.49$).

Responses were scored using the HCSBS scoring key. A repeated one-way analysis of variance (ANOVA) was used to assess the differences between the pre- and post-camp scores on the HCSBS. The results suggest the pre-camp response t-scores on social competence ($F_{1,21} = 5.682, p < 0.027, \alpha = 0.05, \eta^2 = 0.213$) and antisocial behavior ($F_{1,21} = 8.733, p < 0.008, \alpha = 0.05, \eta^2 = 0.294$) are significantly different than the post-camp response t-scores. Thus, the post-camp response scores in social competence increased and antisocial behavior decreased from the pre-camp response scores.

The subscales of both the social competence scale and antisocial behavior scales were analyzed to determine which social characteristics were responsible for the difference between pre- and post- camp response scores. On the social competence scale, a significant difference between pre- and post- camp response scores was found in the subscale of peer relations ($F_{1,21} = 36.424, p < 0.0001, \alpha = 0.05, \eta^2 = 0.634$), but not on the subscale of self-management/compliance ($F_{1,21} = 0.327, p < 0.574, \alpha = 0.05, \eta^2 = 0.015$). On the antisocial behavior scale, a significant difference between pre- and post- camp response scores was found in the subscale of deviant/ disruptive behavior ($F_{1,21} = 16.541, p < 0.001, \alpha = 0.05, \eta^2 = 0.441$), but not on the subscale of antisocial/ aggressive behavior ($F_{1,21} = 0.522, p < 0.478, \alpha = 0.05, \eta^2 = 0.024$).

Each subscale was composed of specific items to determine the level of social functioning. The average difference between the pre- and post- camp response scores was calculated to determine which items had the greatest impact on the overall subscale results. For peer relations, the following items had the greatest mean differences between pre- and post-camp response scores: Item 4, “Offers help to peers when needed” (increase; $\mu = 0.591$, $SD = 1.0075$); Item 26, “Has good leadership skills” (increase; $\mu = 0.455$, $SD = 0.86$); Item 27, “Adjusts to different behavioral expectations across settings” (increase; $\mu = 0.455$, $SD = 1.143$); and Item 28, “Notifies and compliments accomplishments across settings” (increase; $\mu = 0.409$, $SD = 0.959$). For deviant/ disruptive behavior, the following had the greatest mean differences between pre- and post- camp response scores: Item 15, “Disregards feelings or needs of others” (decrease; $\mu = -0.318$, $SD = 0.995$); Item 21, “Whines and complains” (decrease; $\mu = -0.409$, $SD = 0.796$); Item 22, “Argues or quarrels with others” (decrease; $\mu = -0.318$, $SD = 0.945$); Item 30, “Acts impulsively without thinking” (decrease; $\mu = -0.364$, $SD = 1.002$); and Item 32, “Demands help from peers” (decrease; $\mu = -0.318$, $SD = 1.249$). These greatest mean differences suggest these items had the most impact on the subscales of peer relations and defiant/ deviant behavior, respectively.

Discussion

The results of this study suggest that campers’ attendance at an ABA-based academic summer camp can increase social skills in children with autism. More specifically, the most improved aspects of social skills included social communication, peer relations, and a decrease in deviant/disruptive behavior, as well as a decrease in autistic mannerisms. Through analyzing the ratings from the SRS, the campers had improved “motoric aspects of reciprocal social behavior” (p. 17) and a decrease in “stereotypical behaviors or highly restricted interests

characteristic of autism” (p.17; Constantino & Gruber, 2005). For example, campers were better able to communicate and interact through initiating more communication with others and expanding their conversation topics. Through the exploration of new activities, campers found new interests in different foods, toys, and hobbies. The results of the HCSBS indicated that campers made improvements in peer-related social adjustment and developing appropriate friendships, and a decrease in oppositional, explosive behaviors (Merrell & Caldarella, 2002).

Several factors can be attributed to the improvement of social skills at the camp. The camp’s structure focused on ABA strategies to improve socially significant behaviors through positive reinforcement, shaping, prompting, and fading. ABA is a highly effective therapy for individuals with autism (Foxy, 2007), thus the combined strategies of ABA also were highly effective for improving socially significant behaviors, which include social skills of individuals with autism. Even though social skills were not the primary targeted behaviors of improvement for all children, the camp incorporated the children’s deficits in social skills into the ABA strategies. All children were positively reinforced for appropriate social interactions, which was separate from each child’s target behavior of change. If the child made communication attempts with peers and/or counselors, the behavior was shaped through positive reinforcement. When children did not have the skills to independently communicate, counselors prompted communication between children during learning activities to foster peer interaction. As the camp progressed and the children began interacting more independently, the counselors began positively reinforcing behaviors that were closer to typical social behaviors. The combination of these highly effective ABA strategies most likely impacted the improvement of the children’s social skills.

The token economy combined with the level system for receiving back-up reinforcers was another factor that influenced the improvements in social behavior. A combination of positive reinforcement of social praise and tokens was given to children when they interacted appropriately with peers and staff members. Because the “pay offs” were based on a level system, campers wanted to earn the most tokens possible each day to receive the most preferred back-up reinforcer (e.g., pool time or playground). As the campers were reinforced for appropriate social behavior and became more aware of the contingencies to receive the back-up reinforcers, social behavior increased to meet the criteria to receive tokens. Extinction was utilized on oppositional behaviors; thus, campers did not receive tokens for explosive behaviors. For example, the aggressive behavior (i.e. hitting, kicking, and biting) of a 7-year-old boy with autism decreased to virtually no incidences of explosive behavior by the end of the camp. The removal of reinforcement for defiant behaviors was evident in the decrease of ratings score for antisocial behavior.

Another factor for the decrease in defiant/disruptive behaviors could be the improvements in social abilities. The prompting of social behaviors by staff members taught the campers the appropriate interaction to demand for an item. As the campers’ knowledge increased and the appropriate social behaviors were reinforced, they were better able to use verbal expression as a form of communication instead of defiant behavior. This decreases the incidence of defiant/disruptive behavior and increases social communication.

The camp setting also was a factor that facilitated the development of social skills. The 2:1 ratio of campers to counselors allowed staff members to closely supervise the campers’ behaviors and reinforce approximations to the target behaviors. Also, the combined structure of academics with extracurricular activities in a camp setting gave the campers opportunities to

interact with peers. Many of the learning activities were focused on independent learning based on the day's lesson. Independent learning focuses less on a teacher interacting with the entire group and more on staff members individually interacting with each camper. This allows for more social opportunities for the campers because they have the time to be prompted by staff members to interact with peers or independently interact with peers.

When comparing the differences between the subscales that were statistically significant with the subscales that were not statistically significant, the statistically significant subscales were related to behaviors while the statistically insignificant subscales were more likely to assess cognitive characteristics of autism. Because the camp's therapeutic model was ABA with a focus on changing socially significant behaviors, changing the cognitive deficits of autism in the campers was not a concentration. Research has noted that ABA interventions show poor improvement in the areas of intellectual and cognitive abilities (Reed, Osborne, & Corness, 2007). Thus, the effectiveness of the camp's behavioral therapeutic model is reflected in the statistically significant subscales, while the statistically insignificant subscales displayed cognitive abilities, which the camp's therapeutic model did not stress.

The experiences that the campers encountered in the camp setting are different from experiences in the school setting. Many of the campers had not attended a summer camp before, but all the campers attended a typical school. The major difference between a school and camp setting is that camp activities are held outdoors while school activities are held indoors. The different location of the camp allowed staff members to create unique activities for the outdoor environment. Some of the outdoor activities included "messy" activities (e.g., throwing paint balls, relay races with food, teaching math in a swimming pool, teaching language arts in camp crafts, etc.), scavenger hunts, and singing and dancing with props. The difference in settings

allowed campers to experience new activities that they would not normally experience in a school setting. These new experiences could have impacted the decrease in autistic mannerisms, where children were less likely to have highly restricted interests because of their positive experience with novel activities and reinforcement for participation. This could have broadened their hobbies; thus, decreasing their restricted interests.

Because the mothers did not supervise or interact with their child in the camp setting, the generalizability of social skills to the home setting can be inferred. Differences between pre- and post-camp social skills scores indicated that mothers saw a difference in their child's social behavior in the home setting. The ABA-based structure of the camp and the development of the children's social skills generalized to settings outside of both academic and camp settings. Thus, when ABA-based interventions focused on target behaviors, which include social skills, are used on children with autism at a summer camp, the children are able to generalize the improved behaviors to other settings, such as home.

A few limitations of this study should be noted. First, the sample size of this study is small, which limits generalizability. Because of limited resources for the camp, the maximum number of children who could participate in the camp was thirty. This constraint automatically reduced the sample size before the study began. The sample size was further reduced by the lack of participation of eight mothers, who did not fill out at least one set of assessment forms. The small sample size also limited the diversification in diagnosis, with a high amount of participants who were previously diagnosed with autism. A larger sample size would have allowed a more equal distribution of diagnosis. Even though the sample size is small, the statistical findings suggest that a summer camp can change social skills.

A second consideration is that a control group was not used to measure maturation factors of the campers. Without a control group, maturation effects cannot be controlled. Thus, the improvement of social skills in the experimental group could be a result of maturation. However, given the short time period of the camp, progress in social skills due to maturation factors alone could not be the only factor for the improvement. Progress in skill development in children with autism occurs when the child receives at least 25 hours of therapy per week, 5 days per week (National Research Council, 2001). However, future studies should aim to include a control group and increase the number of participants.

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Table 1

Descriptive Statistics for the Social Responsiveness Scale

Scale Name	Minimum	Maximum	Mean	SD
Total Score	49.0	91.0	69.6	12.1
Pre-camp				
Total Score	54.0	103.0	79.9	13.5
Post-camp				
Social Awareness Subscale	55.0	103.0	77.2	14.4
Pre-camp				
Social Awareness Subscale	44.0	97.0	73.3	14.4
Post-camp				
Social Cognition Subscale	51.0	108.0	84.4	15.0
Pre-camp				
Social Cognition Subscale	57.0	104.0	81.8	14.5
Post-camp				
Social Communication Subscale	43.0	94.0	67.6	12.1
Pre-camp				
Social Communication Subscale	52.0	101.0	75.8	13.8
Post-camp				
Social Motivation Subscale	51.0	109.0	74.0	16.1
Pre-camp				
Social Motivation Subscale	40.0	94.0	70.2	14.3
Post-camp				
Autistic Mannerisms Subscale	53.0	117.0	81.2	19.2
Pre-camp				
Autistic Mannerisms Subscale	56.0	109.0	78.3	16.4
Post-camp				

Table 2

Descriptive Statistics for Home and Community Social Behavior Scale

Scale Name	Minimum	Maximum	Mean	SD
Social Competence Total Score	12.0	43.0	30.6	8.5
Pre-camp				
Social Competence Total Score	12.0	49.0	34.3	9.8
Post-camp				
Peer Relations Subscale	22.0	48.0	33.3	7.4
Pre-camp				
Peer Relations Subscale	28.0	73.0	53.4	11.5
Post-camp				
Self-Management/ Compliance Subscale	29.0	75.0	55.0	12.2
Pre-camp				
Self-Management/ Compliance Subscale	40.0	74.0	55.8	10.7
Post-camp				
Antisocial Behavior Total Score	25.0	53.0	36.9	7.9
Pre-camp				
Antisocial Behavior Total Score	27.0	58.0	40.7	9.5
Post-camp				
Defiant/ Disruptive Subscale	24.0	50.0	36.9	8.7
Pre-camp				
Defiant/ Disruptive Subscale	39.0	84.0	53.0	12.6
Post-camp				
Antisocial/ Aggressive Subscale	38.0	78.0	53.9	11.5
Pre-camp				
Antisocial/ Aggressive Subscale	38.0	83.0	53.5	12.7
Post-camp				